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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b)

Attorney Docket No. 004117.P006X

First Named Inventor or Application Identifier Holt et al.

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ADDRESS TO: **Assistant Commissioner for Patents**
Box Patent Application
Washington, D. C. 20231

APPLICATION ELEMENTS
See MPEP chapter 600 concerning utility patent application contents.

1. X Fee Transmittal Form
(Submit an original, and a duplicate for fee processing)

2. X Specification (48 ___)
(preferred arrangement set forth below)
- Descriptive Title of the Invention
- Cross References to Related Applications
- Statement Regarding Fed sponsored R & D
- Reference to Microfiche Appendix
- Background of the Invention
- Brief Summary of the Invention
- Brief Description of the Drawings (if filed)
- Detailed Description
- Claims
- Abstract of the Disclosure

3. X Drawings(s) (35 USC 113) (12)

4. ___ Oath or Declaration (__)
   a. ___ Newly Executed (Original or Copy)
   b. ___ Copy from a Prior Application (37 CFR 1.63(d))
   (for Continuation/Divisional with Box 17 completed) **(Note Box 5 below)**
   i. ___ DELETIONS OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).

5. ___ Incorporation By Reference (useable if Box 4b is checked)
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. ___ Microfiche Computer Program (Appendix)

7. ___ Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
   a. ___ Computer Readable Copy
   b. ___ Paper Copy (identical to computer copy)
   c. ___ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. _____ Assignment Papers (cover sheet & documents(s))

9. _____ a. 37 CFR 3.73(b) Statement (where there is an assignee)

_____ b. Power of Attorney

10. _____ English Translation Document (if applicable)

11. _____ a. Information Disclosure Statement (IDS)/PTO-1449

_____ b. Copies of IDS Citations

12. _____ Preliminary Amendment

13. X Return Receipt Postcard (MPEP 503) (Should be specifically itemized)

14. _____ a. Small Entity Statement(s)

_____ b. Statement filed in prior application, Status still proper and desired

15. _____ Certified Copy of Priority Document(s) (if foreign priority is claimed)

16. X Other: Unsigned Declaration and Power of Attorney (Total Pages 5)

17. **If a CONTINUING APPLICATION,** check appropriate box and supply the requisite information:

___ Continuation ____ Divisional X Continuation-in-part (CIP)

of prior application No: 09/ 336,020; 09/565,674

18. **Correspondence Address**

_____ Customer Number or Bar Code Label _____ (Insert Customer No. or Attach Bar Code Label here)

or

X Correspondence Address Below

NAME _____

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Attorney Docket No.: 004117.P006X

Patent Application

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

TITLE OF THE INVENTION

INFORMATION SEARCH, RETRIEVAL AND DISTILLATION INTO KNOWLEDGE OBJECTS

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Information Search, Retrieval and Distillation Into Knowledge Objects

Related Application

This application is a continuation in part of presently co-pending application serial number 09/336,020, filed June 18, 1999, entitled "Method and Apparatus for Composing A Search, for Searching a Corpus of Information or the Internet, for Displaying the Search Results in an Easily Viewable Manner, and for Crawling, Summarizing and Structuring the Corpus of Information"; and co-pending application serial number 09/565,674 filed May 4, 2000, entitled "Information Search, Retrieval, and Distillation Into Knowledge Objects". These related applications are hereby incorporated herein by reference.

Field of the Invention

The invention generally relates to searching a network for text and non-text data, and providing for storing and forwarding search results. More particularly, the invention relates to applying linguistics and syntax analysis to augment searching.

Background

Recently there has been a vast proliferation of networking connection options, for businesses and general users alike, for connecting to networks such as intranets and the Internet. Many such businesses and users position themselves as an end point, or point of interest (hereafter generally "web sites"), to whom others can connect and obtain information and other material. After several years of such end points becoming accessible of the networks, an

enormous amount of information and other material is now available in an online electronic format.

A typical method for locating and reviewing such information is by way of a "web browser", such as Netscape Navigator, Internet Explorer, Opera, and other network application programs (hereafter generally "browsers"). Unfortunately, the very richness of available information has made finding anything specific an enormously complex and tedious task. The vast number of available web sites can be likened to a beach, where a particular search seeks to locate a particular few grains of sand.

Typical search methods employ either data categorization or keyword searching. In the former, a well known example is www-Yahoo-com, which provides broad categories and successively narrower topic areas. In the latter, there are typically two types. The first are traditional search engines such as NorthernLight-com, AltaVista-com, Excite-com, and the like, which "crawl" web sites and index the words found therein. The second are "meta" search engines, such as SurfWax-com, DogPile-com, and the like, which execute a search across multiple search engines, and provide options for collating results. It is estimated that only 10% of all web sites are indexed. (Please note that periods within uniform resource locators (URLs) have been replaced with hyphens to prevent hypertext links in an online copy of this application.)

Unfortunately, both categorization and keyword searching have significant drawbacks. Categorization requires intervention to place a site within a relevant category or categories. Such categorization is very subjective, and

therefore may result in significant omissions or misleading results when a searcher drills down to detailed categories. And, categorization is resource intensive, and therefore few web sites are categorized. Thus, typically, only "main stream" sites are categorized.

Although keyword searching does not suffer the subjective effects of categorization, such searching requires a searcher to know the correct terms to use in order to perform an effective search. And, such searches typically result in a vast number of irrelevant search results ("hits") due to multiple uses for terms in diverse disciplines. For example, a search for "international policy" will return results concerning politics, college admission standards, international newspaper policies, foreign advocacy, etc., as each would use those terms someplace on their web page.

A further limitation to both techniques is that once the task of determining search results is accomplished, and results provided to a searcher's browser, there is no way to share those results with another party without re-executing the search. This results in a huge waste of computing resources. A related limitation is that the inherent lack of structure to web page data tends to result in web pages having large volumes of data within a given search result, where little of the web page data may actually be relevant to a particular query. In addition to making it difficult to find a relevant portion of a search result, large results can overwhelm the output capabilities of some devices (e.g., mobile devices) used for searching.

Summary

Methods and apparatuses are disclosed for searching bodies of knowledge, such bodies including previously indexed source documents reachable over a network, search results from previous searches, and results from performing meta-searches. Search criteria is received from a client. The bodies of knowledge are searched based on the search criteria, and search results provided responsive to said searching. The search results may be configured with a distillation trigger, wherein selecting a trigger causes a related search result to be distilled in real-time. Distilled search results can be indexed into portions of the source document for focused entry, and can also be grouped and analytically presented on mid-menus to allow the user to review distilled data in summary form. Results may also have associated status symbols (or tokens) indicating by symbol a particular topic to which a result is related. For example, user perceptible characteristics of the symbol, such as shape or opacity, can be used to indicate a result's topic area, concept, document type, and apparent relevance to the search criteria.

Brief Description of the Drawings

Features and advantages of the invention will become apparent to one skilled in the art to which the invention pertains from review of the following detailed description and claimed embodiments of the invention, in conjunction with the drawings in which:

FIG. 1 illustrates a general hardware environment according to one embodiment of the invention.

FIG. 2 illustrates exemplary search domains utilized by the FIG. 1 embodiment of the invention.

FIG. 3 is a flowchart illustrating typical operations undertaken by a user to perform a search with a search server.

FIGS. 3B-D illustrate user preferences dialogs used during the FIG. 3 exemplary search.

FIG. 4 illustrates a search results window containing an exemplary list of search results from the FIG. 3 exemplary search.

FIG. 5 illustrates the distillation extraction process according to one embodiment of the invention.

FIG. 5b illustrates the generation of mid-menus according to one embodiment of the invention.

FIG. 5c illustrates context-zooming according to one embodiment of the invention.

FIG. 6 illustrates an exemplary output from the distillation process for a source document.

FIG. 7 illustrates a suitable computing environment in which certain aspects the illustrated invention may be practiced.

Detailed Description

Various exemplary embodiments of the invention are illustrated and discussed herein. In one embodiment, the invention is directed towards searching the Internet, which is a well-known collection of public and private data communication and multimedia networks (e.g., intranets, Wide Area Networks (WAN), Local Area Networks (LAN), wireless networks, cable television based networks, etc.), that operate using common protocols to form a world wide network of networks.

Throughout embodiments of this invention, various input/output devices and techniques are contemplated, including, but not limited to, wireless, mobile, voice-activated, voice recognition, and audio text-to-speech devices and techniques. Examples include, but are not limited to, personal computers (PCs), laptops, Personal Digital Assistants (PDAs), cellular telephones. A mix of input/output modalities is, therefore, contemplated. For example, a user may use a keypad on a PC, PDA, or cellular telephone, for instance, to enter input, and may receive search results via a browser; a user may use voice to communicate, and may receive results via a browser; and a user may use voice to communicate, and may receive a response via text-to-speech audio feedback. Communication mediums may be wired, including Public Switched Telephone Network (PSTN), Plain Old Telephone System (POTS), the Internet, Integrated System Digital Network (ISDN), and DSL (Digital Subscriber Line), cable modem, for example, or wireless, including microwave and satellite transmissions, or combinations thereof.

Searching can be focused on retrieving text-based documents, graphics, web pages, or other desired data types, such as structured storage (databases and the like), music, spreadsheets, and the like. For simplicity, it is assumed a search query is in English language, but, other languages and data formats (e.g., graphics) may also be searched. (For example, a graphics fragment could be dropped into a query box by way of Object Linking and Embedding (OLE) or through a Java Bean or ActiveX object.)

For the purposes of this description, the terms Uniform Resource Locator (URL), document, origination and source address are intended to be generally synonymous, as each term essentially references particular information at a particular network location. For simplicity, it is assumed addresses conform to the Transmission Control Protocol/Internet Protocol (TCP/IP) dot quad format (0.0.0.0). However, it should be appreciated that other address formats (such as wireless node identifiers) may be used without loss of generality.

It is assumed search commands and results are English based. However, such is not required, so long as individual language components can be identified, and appropriate analysis models provided for desired search types. The phrase "candidate source document" will be used to refer to an information source that may be returned to a user in response to a search request, depending on whether search criteria is satisfied.

FIG. 1 illustrates a general hardware environment according to one embodiment of the invention. Also described are general overviews of some features and advantages of illustrated embodiments. A client **100**, operated by a

user/person or expert system (artificial intelligence), communicates with a search server **102** through a network **104** such as the Internet. Other clients **106**, **108** also communicate with the search server. Generally, a user of the client **100** may perform searches, with results provided according to preferences associated with the user (see FIGS. 3). These results can also be made available to other users, such as operators of clients **106**, **108**.

Source documents (e.g., search results) can be returned to a user "as is," or in a "distilled" format, which is a reduced content version of a source document. For example, for a text document, distillation provides a condensed abstract of the document based on the language within the source document (see FIG. 4). Distillation is advantageous for client devices having limited display areas, such as Personal Digital Assistants (PDA), portable computers, Wireless Application Protocol (WAP) enabled devices, such as mobile phones, pagers, two-way radios, and "smartphones,", and other portable communication or computing devices having limited screens and/or computing resources (the phrase "mobile device" will be used to generally reference such PDAs, WAP enabled devices, portable communication or computing devices, etc.). Distillation is also generally helpful as it may be configured to provide a consistent interface displaying brief (per user preferences) overviews of source documents, thus allowing, for example, one to quickly determine the relevance of particular search results.

In one embodiment, a user of the client **100** and clients **106**, **108** contact the search server **102** to submit search criteria and receive results

thereto. It is expected that searches are keyword or natural language queries. It will be appreciated, however, that searching is not limited to text searches. For example, pattern analysis or image recognition may be applied to image data to locate images by their data content. Search results are obtained through comparisons of search criteria with known search domains (see FIG. 2) such as previously indexed web pages **202**, meta-searches **204**, by piggy-backing **206** onto private search engines, or searching against saved searched **208** of other users. Search results have an associated icon for creating a distillation of a result according to set user preferences (see FIGS. 3).

In one embodiment, search results are packaged as structured objects, such as HTML or XML objects (hereafter "result objects"), with appropriate characteristic tags to identify the original searcher (user of the client **100**), as well as the nature and contents of the search results. For example, if a user wanted to see focus words in a document, a focus words XML section would be defined with the appropriate words therein. It will be appreciated that other structured storage can represent result objects; XML is assumed due to its text-based data tagging and broad industry support. (The phrase "knowledge object" may refer to a single result object, as well as a collection of result objects.)

Because XML provides tagged structure to result objects, such objects may be linked within a structured lexicon, allowing building a heuristic search capability for subsequent searches, as well as user communities of interest based on saved searches. Result objects may also include public

encryption keys or other validation requirements to restrict access to some or all of the tagged sections within a saved result object. Result objects are intended to be E-mailed or otherwise transferred to other users, and in one embodiment, the search servers track result object sharing between users so that users can be informed when there is a change in shared data. In one embodiment, an editorial module (e.g., executed by a search server administrator) allows one to edit and/or contribute supplemental content to result objects.

In one embodiment, an application programming interface (API) is provided for interfacing with a search server **102**. The API provides an interface to the search server, through which third party developers (or users) can provide search services that are integrated with the search server. In addition, the API will enable search server administrators to extend the capabilities or customize a search server without modification to the underlying searching engine employed by the search server.

In one embodiment, the API is implemented by way of executable objects, such as ActiveX controls or JavaBeans (which are Java-based platform-independent controls developed by Sun Microsystems, Inc. of Palo Alto, CA). It will be appreciated that other object formats can be used to implement the API. Executable objects are intended to be stored within a search server **102** (executing as server side objects); however, in an alternate embodiment, executable objects can be stored within result objects for downloading to a client **100** as needed. The executable objects are used by a client **100** as needed based on the preferences (see FIGS. 3) set by a user of the client, e.g., the user

indicates the executable objects should be used when distilling the search results (see FIG. 5).

The executable object, whether stored in a search server or within a result object, may be configured to be executed when search results are received by a client. Associated with the executable objects are extended processing statements that incorporate regular expressions, user preferences, or other data extraction techniques. Extended processing statements can be applied to a source document or a result object, and can be applied by the search server **102** to other result objects associated thereto.

FIG. 2 illustrates exemplary search domains utilized by the FIG. 1 embodiment of the invention (other search domains are contemplated). The central circle **200** pictorially corresponds to the "universe" of a user's search query, e.g., the theoretical extent of a search as determined by the particular search criteria and search options (FIGS. 3) used by a user. The upper left circle **202** corresponds to data previously known to a search server by way of prior data acquisition, web crawling, etc. The intersection of the user's query circle **200** and the known knowledge sphere **202** corresponds to search results from within this known knowledge that satisfies the user's search query.

The upper right circle **204** corresponds to acquirable knowledge from performing meta-searches, e.g., searches by way of other search engines. As with the known knowledge, intersection of the acquirable knowledge circle **204** circle with the query circle **200** corresponds to relevant search results from this particular search domain. Similarly, the lower right circle **206** corresponds to

acquirable knowledge from piggy-backing onto private search engines provided by individual web sites, such as those search engines provided by universities, government web sites, or the like. In the piggy-back configuration **206**, the invention may, for example, visit a private or local search page for the Massachusetts Institute of Technology, execute a search thereon, and provide filtered search results to the user of the client **100**.

The lower left circle **208** corresponds to search result objects stored by the search server **102** and made publicly available by the users generating the results. These publicly accessible results can be included when performing the user's search, and contribute to the current user's search. One advantage of saving previous search result objects for later sharing is that, as illustrated, there can be a portion **210** of saved search data that is no longer available to other search techniques. Knowledge gaps are common as a result of rapid changes in online data content. In one embodiment, "keys" are assigned to user search result objects, where the keys operate as an identifier of the type of data stored within the result object. (Keys can be thought of as a form of a Dewey Decimal system for result objects.)

FIG. 3 is a flowchart illustrating typical operations undertaken by a user of the client **100** to perform a search with a search server **102**. A first operation is for a user to login **300** to a search server. Assume that, by way of "cookie" files, or other techniques, such as login forms, a user authenticates with a search server. Authentication allows user preferences to be saved and restored across different search sessions. Preferences include how search

results should be parsed for distillation into a result object, including setting value ranges for date, money values, viewing formats, as well as other output formats (e.g., audio), output data formats (e.g., HTML, WML, XML, plain text, etc.), and other data priorities for the user.

After logging in 300 the user's connection device is sensed 302 for communications characteristics, such as display characteristics or audio characteristics, and output formats are adjusted accordingly.

After logging in **300** the user's connection device is sensed **302** for display characteristics, and viewing formats are adjusted accordingly. Unless overridden or supplemented by a user preference, the search server automatically tailors output according to a user's connecting device characteristics, and/or other user preferences or characteristics such as psychometrics associated with the user, which may require overriding or supplementing view preferences discussed below. Thus, a user using a computer having a large browser window can be presented with results differently than will a mobile device.

Mobile devices may access the Internet with a restricted browsing environment, such as a "microbrowser" tailored for small data files, limited memory, and low-bandwidth requirements typical of most wireless networks. Consequently, rich source document content is reduced (e.g., graphics are converted to low-resolution) or discarded. And, data for the mobile device is converted into a format suitable for receipt by the mobile device. For example, currently, WAP enabled devices expect data to be encoded in WML (or

equivalent), which is an XML variant specifically devised for small screens and one-hand navigation without a keyboard. WML output may include WMLScript, a JavaScript-like language tailored to a WAP enabled device's restrictive computing environment. Thus, as needed, data , whether previously encoded in HTML, XML, or other data format, is converted into WML (or other needed format) for receipt by a mobile device.

After logging in, a test **304** is then performed to determine whether the connecting user is a new user. If not new, a second test **306** is performed to determine whether to load previously used search results. If so, then search preferences, data types (e.g., dates, names, historical events, geography, job skills, etc.), and viewing preferences discussed below are loaded **308** for the user. In one embodiment, the user is prompted with a list indicating previously saved search sessions that may be retrieved. If the user does not desire loading previous searches, then processing continues with setting search preferences.

If the user is a new user, the search server creates a new record for the user with name, password preference option fields unset, and the user selects **310** a name and password. A user's profile is stored in a database associated with the search server. In one embodiment, different search servers maintain their own user databases, but cross-check with each other to verify if an apparently new user is known to another search server; if so, then the user's preferences can either be used remotely or copied locally and synchronized with the other search server. In one embodiment, multiple search servers share common (perhaps virtual) permanent storage.

The user may now choose to set **312** a variety of options to control searching, distillation (abstracting) and viewing of search results. Options are separated herein into three general categories, search preferences affecting the search process, data type preference controlling distillation of search results into result objects, and view preferences controlling display of data captured within a result object. In one embodiment, search options are internally represented by a search server as a series of constraint rules that are solved to determine whether a candidate source document meets all user options.

FIG. 3B illustrates a Set Search Preferences dialog box **330**. A first option is set Search Time **332**. This option indicates how long the search server should wait for results from search resources **202-208** (FIG. 2). Another option is a Search Depth **334** option. This option controls how many results to return from a source, or how "deep" to search within a site if a depth-first type of traversal is being performed.

Another option is a Results Sorted **336** option. This option controls whether to sort results by "apparent title" or document source. The phrase "apparent title" is used as some sources, such as web pages, embed control tags (e.g., HTML statements) indicating a page's title. Other data sources, such as plain text files, word processing files, spreadsheets, databases, etc., do not have associated tags indicating a title. In one embodiment, for text files, the first few words in the file are used as a title. In other file formats, a viewer filter is applied in effort to determine a title. For example, in the word processing file example, the file may contain an embedded document properties object indicating a title, or

the first few words of the file can be used as the title. If no possible title can be determined, the source document's network location (e.g., its URL in an Internet context) can be used as a title.

Another option is a Results Highlighted **338** option. This option determines whether to highlight the context within search results. In one embodiment, highlighting means to bold face or otherwise accentuate (for example, with auditory feedback) search terms within a source document.

FIG. 3C illustrates a Select Data Types To Find dialog box **350**. Generally, after performing a search, a user has the option of clicking on a particular search result, causing that result to be presented to the user (e.g., in a new browser window), or the user may request real-time distillation by selecting a distillation trigger (FIG. 4 item **402**) of the source document into a result object (FIG. 6). The FIG. 3C dialog provides an exemplary list of data types, which when selected, constrain distillation of a source document. Only source document content satisfying selected data type constraints will occur in a result object.

It will be appreciated that these requirements can also be used to determining the user's initial list of search results. That is, after entering a search, a candidate list of search results is determined in accord with traditional searching methods. Without displaying the search results to the user, the search server instead prepares distilled result objects for each candidate result, and applies the search criteria to the distilled data, and removes source documents not containing the search criteria in the distilled data. Thus, if the user seeks a

certain type of document having identifiable language constructions and lexical structure, such as legal documents, the search server can pare the initial search results to remove documents failing to have appropriate structure.

In one embodiment, the distilled object is compartmentalized. For example, if constructed as an XML object, the result object is defined with tags (or equivalent structural definitions for other data formats) are defined containing matching source document text for each data type option. For example, a Dates/Times **352** constraint can be selected, causing the user to be presented with options for setting valid date and time values, ranges, and formats (e.g., month/day/year, day/month/year, month/year, etc.) for data in the distilled result object. After distilling a document source, the result object then contains an XML tag pairing, such as <DATES> </DATES> containing matching source document data meeting the data type criteria.

Other options include Abstracts options **368** which allow setting requirements for sentence position, density, word frequency, sub-phrase parsing, etc. characteristics for data to be included in the distilled data. Source document data meeting these requirements are included in the result object within an appropriately labeled tag pairing. Abstracts can also be defined with respect to one or more of the data types discussed herein, such as key points **370**, focus words **372**, author's summary, or other data of interest to the user.

The Key Points 370 option causes a candidate source document to be analyzed to identify key sentences. Key sentences can be determined, for example, by word matching, sub-phrase parsing, special part of speech parsing,

use of action words, word frequency counting, and based on other lexical analysis techniques known in the art. Key sentences may comprise entire sentences, portions thereof, or combinations with one or more other sentences. For example, a key sentence may be a phrase, or a slug of text having no structured connotation. It will be appreciated that other known techniques for identifying key sentences may be used.

The Focus Words **372** option causes a candidate source document to be analyzed to identify focus words. As discussed in patent application serial no. 09/336,020 (which is incorporated herein by reference), focus words are related terms and phrases for a particular word or phrase, where the related terms are concepts or terms that are narrower, roughly equivalent, or broader in scope than words in a source document. Focus words can be determined by testing for part of speech, capitalization, word frequency checking, and presence in various word dictionaries such as Names, personal, corporate, geographic, events, holidays, and the like. Focus words determination can also be applied to the user's search query to aid in formulating a query of proper scope.

Another option is an Emphasis Items **374** option. When a source document is analyzed, all structural elements, such as tag pairings or other devices used to denote document structure, are identified and their contents stored and associated thereto. Thus, if a source document contains <TITLE>My Title</TITLE>, the text "My Title" is stored and associated as being part of the TITLE tags. Selection of this option causes a supplemental user interface (not shown) to be presented, where the user may selectively elect to view (according

to user view preferences) particular structural elements (such as the TITLE tag data) and their associated data.

FIG. 3D illustrates a set View Preferences dialog box **380**. The view options control how distilled contents within a result object are displayed to a user. Note that if the user was sensed **302** to be connecting to the search server by a restrictive device such as a mobile device, display options may be overridden or supplemented to conform to viewing capabilities of the user's particular connecting device.

View options generally correspond to the distillation data types discussed above, and operate under similar principles. View options allow a user to sort order of appearance, determine what to emphasize (e.g., Emphasis Items **374** option), set minimum and maximum viewable values, for example, set a limit to the total number of dates shown, show only the N most often occurring dates, etc., for data within the result object. Note that one need not set a data type option in order to use a corresponding view option. For example, once can omit date range restrictions on distillation, yet require them to control display.

In one embodiment, a user may select a "Learn from Sample" button **382** to visually see the effect of selected data types and viewing options. Learn from sample allows a search server to provide a visual tutorial as to the effect of options available to the user, and allow the user to compose complex searches based on perceived results.

In a further embodiment, as discussed above with respect to FIG. 1, executable objects, such JavaBeans or ActiveX controls, may be used to

refine or control distillation of search results. If this embodiment, a user may set a viewing preference (not illustrated) indicating such executable objects are to be used in the distillation process.

Continuing again with FIG. 3, once the user has set or accepted default values for search preferences **312**, data types, and setting viewing preferences, the user then submits **314** search criteria to be searched for within available search domains (e.g., FIG. 2). In one embodiment, search criteria can be forcibly included or excluded through use of +/- (or equivalent), causing search results to correspondingly include or not include criteria so designated. In one embodiment, the search server applies date/time sensitive analysis to adjust the weighting of results priority (unless results are ordered/alphabetized). For example, a search term of "hearts" in February would rank higher valentine's day results.

In another embodiment, a user may enter a natural language query, or non-speech query, such as a search-by-example query for graphics image data. That is, exemplar graphics data can be dragged and dropped into a search box, and the search server locates image files, and performs image analysis (e.g., Motion Picture Experts Group (MPEG) imaging techniques) to identify results similar to the exemplar.

In one embodiment, a simplified preference setting interface (not shown) is presented to a user, where the simplified interface allows the user to select from several default search and distillation categories, where selection causes various of the above-described options to be set automatically for the

user. For example, one category might be "Educator", another "Pharmacist", or another category might be "Human Resources." Alternatively, psychometric measures, for example, an adjective check list, may be used to set these default options. In each case, the four main types of user preferences would be set to default values deemed appropriate for each search category. In this embodiment, the user may select and advanced options page to display and adjust the default values.

After entering the search criteria, the search server performs **316** a typical search through known domains (FIG. 2), resulting in a list of source documents satisfying designated search criteria. The user can then select **318** a listed source document, causing it by default to be opened in a separate browser window. Use of the separate window allows maintaining the contents of the search results window. Or, the user selects **320** a distillation icon **402** (FIG. 4), which by default is displayed adjacent a source document link **404** (FIG. 4), where selection causes distillation of the associated search result link **404** according to the user's set preferences (FIGS. 3).

Assuming election to distill a source document, the search server then extracts **322** (see FIG. 5) the clicked on source document according to the data types, rules, ranges, and view formats designated in the user's options **330**, **350**, **380**.

FIG. 4 illustrates a search results window **400** containing an exemplary list of search results. The results are typically a list of URLs, document titles, or brief descriptions (abstracts) of source documents. As

discussed above, the search results list includes a distillation trigger **402** (FIG. 4) such as an icon or other triggering region that is presented here adjacent to a search result **404**. (Distillation is discussed in FIG. 5.)

Also illustrated are "knowledge representation" symbols (or tokens) **406**. In one embodiment, these symbols have associated user perceptible characteristics, such as shape or opacity, which can be used to indicate a result's topic area, concept, document type, and apparent relevance to the search criteria (hereafter generally "topic area").

For example, one symbol may represent document age, where a hollow outline indicates an old source document, while a solid symbol means a new or current source document. Or, a symbol may represent the number of words in a source document, or number of pages, where a solid portion of a symbol indicates relative length of the source document. Or, a symbol may be associated verb activity within a source document, so that if a document is lexically analyzed (such as through analysis of verb structures) and determined to be "active", then a solid portion of the symbol is used to indicate such activity (perhaps as a ratio relative to the source document's size).

In one embodiment, representation symbols are associated with the searcher's search terms, thus allowing a searcher to evaluate apparent relevance of a search result to a particular topic area based on user perceptible characteristics (e.g., symbol shape, opacity, sound, etc.) of the representation symbols **406**. In one embodiment, a user may also create, edit, or assign representation symbols to results, thus categorizing results as belonging to

certain result type categories, e.g., identifying source documents concerning religion, politics, money, legal, medical, etc.

FIG. 5 illustrates the distillation extraction process according to one embodiment of the invention. Each of a user's data type and rules/ranges options are used to both identify which data to consider for extraction, and the scope (amount) of the extracted information. Note that since the illustrated sequence of operations each operate on the original source document contents, the illustrated order of operation is arbitrary, and in fact, can be performed in parallel to increase efficiency.

A first operation is to identify **500** all source tags (e.g., HTML, XML, etc.) within a candidate source document, and save the content (values) of the tags into variables determined according to the user's options (FIGS. 3). For example, if the user sets an option to receive title information, then if a title is identified within the source document, then the identified title is placed within appropriate (e.g., <TITLE></TITLE> XML tags (recall that the result object is, by default, encoded as an XML object).

Regular expression pattern matching rules (e.g., akin to the Unix "grep" command) are applied **502** to isolate data elements such as dates, part numbers, etc. of interest to the user. After isolating these data elements, for text based source documents, the source document is reduced into five "data levels" corresponding to (1) identifying document paragraphs **504**, (2) identifying paragraph sentences **506**, (3) identifying sentence phrases **508**, (4) identifying phrase sub-phrases **510**, and (5) identifying sub-phrase focus words **512**.

Paragraphs are identified **504** through identification of hard return characters (e.g., ASCII characters 10, 13, word processing end of line characters, etc.), manual line breaks, blank lines between blocks of text, and the like. If the source document structured document such as HTML, DHTML, JavaScript, XML, WML, etc., the source document is also processed for indications of paragraph breaks based on punctuation related tags. For example, in an HTML type of source document, the paragraph tags (<P>) or use of a double break tag sequence (

) are treated as defining paragraphs.

Sentences can be identified **506** by isolating the use of punctuation (e.g., periods, question mark, exclamation point, etc.) to locate ends of sentences. In addition, punctuation usage is compared to exemplars so as to recognize certain types of sentence constructions, such as the salutation "Dr". Identified sentences (or "slugs" of connected text, since not all source documents, such as HTML type sources, follow conventional grammatical structures) can be identified by isolating use of punctuation (e.g., periods, question mark, exclamation point, etc.) to isolate ends of sentences. As with paragraph detection, use punctuation is compared with exemplars. If the source document structured document such as HTML, etc., the source document is processed for a combination of punctuation in combination with sentence ending structure such as single or double line spacing, or punctuation tags such as a break tag (
).

Phrases can be identified **508** based on punctuation patterns. In one embodiment, phrases are identified as comma delimited portions of identified

sentences. Alternatively, lexical analysis tools can be applied to parse the grammatical structure of the source document so as to identify phrases therein.

Sub-phrase focus words can be identified **512** by parsing phrases into sub-phrases **510** by comparing identified phrases to a lookup table containing conjugation slugs. (See also parent application serial no. 09/336,020 for focus word extraction techniques.) For example, a partial lookup table might contain a list the following English conjugation phrases:

Entry	Conjugation Slug
1	to the
2	to a
3	to an
4	of the
5	of a
6	of an
7	by the

In one embodiment, the lookup take is implemented as a programming array containing strings, where each array entry contains a conjugation slug.

If the search server encounters a conjugation slug, the portion of the phrase preceding the conjugation slug is labeled, and the sub-phrase and identified conjugation slug text is removed from the source document text being inspected, and processing continues with the remaining text to identify other conjugation slugs and associated sub-phrases. In one embodiment, labeling means to store the n^{th} identified sub-phrase in an array, where new entries are entered for each such phrase. It will be appreciated that other data structures may be used to store identified sub-phrases.

After identifying the sub-phrases, the search server submits them to a core extraction process that uses part-of-speech dictionaries, known

grammatical structures, dictionaries of controlled-vocabularies specific to a domain (e.g., law, medicine, proper names, historical events, etc.), capitalization-weighting rules, phrase-construction rules, and de-duplication algorithms to identify focus words from the identified sub-phrases. In such fashion, words not appearing to have significance, e.g., not being found in dictionaries or appearing lexically significant through capitalization or other analysis rules, are ignored. Remaining words are deemed focus words for a source document that convey a distilled essence of the source document.

The source document is also processed to generate **514** an abstract based on identifying paragraphs and key slugs of text based on punctuation patterns, and using position weighting, length limiting, and frequency weighting to identify key sentences in the source document from which to compose an overview abstract of the source document. In addition, the length of the abstract is adjusted according to the sensed **302** display characteristics of the user's connection device. For example, if it is known that the user is using a mobile device, then a small abstract will be generated.

The source document is also processed to generate **516** key points. In one embodiment, the search server inspects each sentence and phrase for patterns of use between verbs within the sentences and phrases. To do so, the server first uses known part-of-speech parsers (e.g., the "Brill POS Tagger" by the Department of Computer and Information Science, University of Pennsylvania, and the Spoken Language Systems Group, Laboratory for Computer Science, MIT) to isolate verbs within a sentence or phrase. Generally,

some source document words are recognized immediately as nouns, verbs, etc., while other words require inspection of prefixes, suffixes, infixes, adjacent word occurrence and other syntactic analysis to identify appropriate parts of speech.

Identified verbs are compared to a hierarchy of "verb sequences" which are groupings of verbs arranged in "process order"; for example: see → pickup → sniff → taste → chew → swallow → smile. The verb sequences are ranked by "level of action" where "state of being" verbs such as "are" and "is" may be ranked near or at the top of the hierarchy, followed by verbs sequences of "action towards", then verbs sequences of "association" then verb sequences of "communication from," etc. The hierarchy of verbs, the sort order, and the arrangement of the verb sequences can vary based on context (associated nouns). The verb sequences may be implemented as sorted arrays, lookup tables, or Java vectors, or other structured format allowing for indicating sequences. (For further information regarding verb sequences, see *Action Words Directory*, published by VORT Corporation (1979), which is hereby incorporated herein by reference.)

Thus, for example, the server may parse the user's search criteria, or a history of the user's or associated users' search criteria (assume a words based search) and compare the search criteria words to a controlled-vocabulary. In one embodiment, the controlled-vocabulary are the identified focus words (discussed above), and they are used to associate nouns to the search criteria. In an alternate embodiment, an array or hierarchy of context-related (subject-based) nouns are compared and associated.

If associated nouns convey no action, e.g., they are not associated with one or more verb sequences, then only "state of being" verbs are used in the key point filtering (extraction) process. But, if the nouns convey action, e.g., they are associated with one or more verb sequences, then the verbs in the controlled vocabulary associated with those nouns are used in the key point filtering process. The key point filtering process involves finding which subsets of text (e.g., sentences or phrases) of the distilled result object contain which of these verbs (or verb sequences and patterns) to select and rank those subsets of text as key points. Further, a user may set preferences (not shown) for assigning a priority to verb sequences (action levels); the priority may then be used as part of a calculation to determine which verb and verb sequences are to be applied in the key point filtering process.

Key points can also be generated by matching words from the user's search criteria to the same words in the source document. As a result, matched-in-context key points are created. For example, if the user's search criteria is "venture capital", matched-in-context key points from a source document comprise:

"Maurice Young Entrepreneurship and **Venture Capital** Research Centre at the Faculty of Commerce, University of British Columbia."

"...**Venture Capital** Consultants. Visit our roster of **venture capital** consultants, including business plan, legal, and marketing..."

"**Venture Capital** Information Sources learn from our listing of **venture capital** information sources, including libraries..."

In one embodiment, a user can set as a user preference how many key points they want in their distilled source document. When there is a limit, the

search server ranks each sentence or phrase against the verb hierarchy, and cuts off **518** the number of key points that qualify based on the selected user preference. The search server can also uses this "number of key points" metric to determine the average number of key sentences should be included in an abstract.

After the extraction process, the search server has all components, e.g., tag values, regular expression matches, abstract, key points, focus words, and other data types of interest needed to construct a distilled version (e.g., result object) for a source document. In one embodiment, the user is provided with viewing preferences to set a numerical and/or relative position for the contents of the distilled source document. For example, the user can assign a first, second, third position for desired data, and/or the user may set relative preferences such that the abstract is above extracted dates (from regular expression matching) but below key points. Fixed and relative position preferences define a constraint system that can be dynamically solved and cause data to be displayed **522** to a user's connecting device.

In one embodiment, identified focus words are also indexed **520** within a database of focus words maintained by the search server for storing identified focus words arising from previous searches by the current and other (different) searchers. In such fashion, processing required to identify focus for one user's search may be re-used in other searches by making the results available to other searchers. In addition, such search retention makes available

content that may otherwise become unavailable due to the original source document being taken offline from the network.

FIG. 6 illustrates an exemplary output **600** from the distillation process for a source document.

As discussed above, the illustrated information is stored within a result object that has been created in real-time for a particular document source. It is assumed that such real-time distillation is responsive to clicking on an icon or other trigger associated with search results. Since distillation is in real-time, and can be based on results obtained from a conventional search, rather than the searching techniques disclosed herein, the distillation process can therefore be added to any existing search engine or other application program having access to discrete bodies of source data.

Based on the user's device characteristics, e.g., regular browser window on a computing device, restricted browser environment within a mobile device, the server presents a result object's contents (the distilled data) in an appropriate data format and language (e.g., HTML, WML, XML) to match both the parameters of the user's device and the user's selected viewing options.

Illustrated for example, are a title **602** that was determined for a selected result, the URL **604** for the source documents being summarized, and various result regions **606**, **608** containing identified data within the source document pursuant to selected search and view preferences.

In particular, the illustrated results provide focus words **608** which may be selected to adjust the search.

A user may perform context zooming, wherein a user is presented with a data type 522 (FIG. 5c), and obtains a focused entry into the source document by selecting the distilled data type. The distillation process automatically enables context zooming 534 when distilled data is displayed 522. A distilled data type can be, for example a key point, an abstract, a matched-in-context key point, or focus word. In one exemplary embodiment, the distillation process automatically creates key points (or other data types) that index 536, in real-time, into a portion of the source document that surrounds the key point, and displays 538 that portion of the source document. An index may include a hyperlink to the surrounding text of the source document (where the amount of surrounding text can be set in by the user's preferences), which may be represented by an icon or text, for example, to zoom into the surrounding text. The amount of surrounding text can be determined by the user (such as through user preferences), or determined by the server in accordance with the user's device characteristics.

Context zooming gives users quick access to the full surrounding text of a key point (or selected data type) from a corresponding source document without having to hear or view the full text of the source document. Consequently, users can bypass text that may otherwise be irrelevant, or may scroll to other portions of the text from the surrounding text. For example, users of small, limited screen devices can zoom in on a portion of the source document, where the portion is appropriate for the particular device. In this manner, the user is able to view relevant portions of the source document without having to scroll through the entire document to find relevant text, and without having to be constrained by the

size of the source document. Furthermore, context zooming gives a user the advantage of access to a specific portion of a document through a given distilled data type (e.g., a key point, a matched-in-context key point, a site link), without loss of context or content since the user is able to select the distilled data type for access to more detailed information.

In one example, a user is presented with three matched-in-context key points distilled from a source document: As search results are distilled 520 (FIG. 5b, indicating a portion of the distillation process prior to displaying distilled data), each search result can be displayed 522 (showing distilled data), and can be further processed to be automatically and dynamically grouped 524 so as to be represented by a mid-menu comprising a list of menu options. A dynamically generated mid-menu creates a stepping stone that allows a user to analyze the distilled data in summary form. Amongst other applications, mid-menus are useful for limited screen displays, such as cellular telephones. One of the advantages of mid-menus is that they provide users with brief and quick *substantive* access to a source document without having to review the full text of the source document , *and* without having to review all the distilled data. Substantive access provides the user with more than mere data descriptions and titles. Substantive access provides the user with information related to a given source document, where the information is processed and categorized.

Each menu option 530 on a mid-menu may comprise a result category, and a corresponding content metric. A result category represents a category of data that has been analyzed and comprises results for the particular category of

data. A content metric represents a qualitative or quantitative value of the particular category to give the user substantive access to a search result, where a quantitative measure may comprise, for example, the number of appearances for a given result category, or the length of text; and a qualitative measure may comprise, for example, a relative precision rating of a data type. The type of content metric that is displayed depends upon the nature of the given result category. Content metric, whether a qualitative or a quantitative measure, can be represented as a number, an icon, or symbol.

When a result category and corresponding content metric is displayed 526, 528 to the user on the mid-menu, the user may select the menu option 530. Selecting the menu option 530 displays the results associated with the result category 532.

A result category may comprise a data type that represents a source document that is distilled in accordance with a data type constraint associated with the data type. For instance, a key point represents distilled data in accordance with a key sentence (which may be an entire sentence, a portion thereof, or combination with another or other sentences); a focus word represents distilled data in accordance with a conceptually related word; and site link represents distilled data in accordance with a URL (Uniform Resource Locator). For example:

```
1> Key Points (8)

2> Matched-in-Context (6)

3> Focus Words (14)
```

```
4> Site Links (4)

5> Full Text (163)

6> Personal Names (9)

7> Patent Issues (12)

8> Back to Results

9> New Search
```

Options 1-7 are data types. For instance, "Key Points" represents key sentences, which may comprise an entire sentence, portions thereof, or combinations with other sentences, that are distilled from the given search result. The numbers in parenthesis represent the content metric, or the value of the corresponding Key Point. In the example above, the content metrics comprise a quantitative measure, namely, content density which tells a user that there are 6 "Key Points"; 6 "Matched-in-Context" key points; 14 "Focus Words"; 4 "Site Links"; and 163 words in the "Full Text" of the document. In one embodiment, "Personal Names" and "Patent Issues" represent names and terms, respectively, found in a lookup table, where a corresponding content metric represents the number of occurrences of personal names in the given source document. (In another embodiment, discussed below, "Personal Names" and "Patent Issues" can be user-defined.)

Alternatively, or conjunctively, a content metric can represent a qualitative measure, such as relevancy or precision, which can be determined by a standard computation linguistic algorithm for precision, frequency, and recall. For example, a result category can be rated for its relative precision to the user's

search criteria, where each of the Key Points is rated, and the 6 Key Points are averaged to determine a precision rating for a result category.

Result categories may additionally comprise user-defined types. As illustrated by the following example, when a user defines search-related preferences, the user may also enter data for user-defined types, such as "SiteSnaps™", "Personal Names" and "Patent Issues" sections.

```
1> SiteSnaps™ (6)
2> Matched-in-Context (6)
3> Personal Names (9)
4> Patent Issues (12)
5> Full Text (163)
6> Back to Results
7> New Search
```

User-defined types refer to any type of data grouping that is useful to the user, but which does not fall into the category of a data type. For example, a user can create a category called "SiteSnaps™" and define it so that it finds a full range of data types, or it finds data types listed by the user. The user can then define its corresponding content metric so that it represents the number of different data types that are returned by a given search (as opposed to how many data types are selected by the user in the user's preferences).

"Personal Names", rather than being a data type, can be defined by the user to search for a name (or names) entered by the user such that the mid-

menu determines how many occurrences of the name (or names) occur within all data types selected by the user. Similarly, a "Patent Issues" category can be created to search for a term (or terms) entered by the user, where the term is (or terms are) related to patent issues, for example, and the mid-menu displays the number of occurrences of the term (or terms) in the data types selected by the user. These user-defined types are exemplary, are not exclusive, and may encompass many other types not discussed herein.

A menu option may also comprise a predefined menu option, as shown by options 8 and 9, and 6 and 7, respectively, on the sample menus above, which represent predefined menu options for navigating the menu.

Furthermore, mid-menus can be based on user preferences, where a user can determine the menu options that are displayed on the mid-menu, in one example, or a server can automatically determine the mid-menu options based on user preferences. When the mid-menu is dynamically and automatically generated, those menu options are automatically displayed.

"Maurice Young Entrepreneurship and **Venture Capital** Research Centre at the Faculty of Commerce, University of British Columbia."

"...**Venture Capital** Consultants. Visit our roster of **venture capital** consultants, including business plan, legal, and marketing..."

"**Venture Capital** Information Sources learn from our listing of **venture capital** information sources, including libraries..."

If the user scrolls to and/or selects the third matched-in-context key point ("Venture Capital Information Sources learn from our listing of venture capital information sources, including libraries...") using a particular device's navigation methods (e.g., voice or keypad), the user would link to the surrounding text of the key points, for example:

"*Venture Capital Information Sources learn from our listing of venture capital information sources, including libraries*, magazines, and venture capital associations. Venture Capital Investors meet a wide variety of venture capital firms in a list so big that it's categorized alphabetically, by development stage, by specialty, and by country."

where the key point is displayed in italized text in this example.

FIG. 7 and the following discussion are intended to provide a brief, general description of a suitable computing environment in which clients **100**, **106**, **108**, search server **102**, and other aspects of the illustrated invention may be implemented. Portions of the invention may be described by reference to

different high-level program modules and/or low-level hardware contexts. Those skilled in the art will realize that program module references can be interchanged with low-level hardware instructions.

It will also be appreciated that most or all of the functionality discussed above for the search server **102** (FIG. 1) can be entirely incorporated into the client device **100** (FIG. 1), or processing shared (according to an appropriate handshaking protocol). In one embodiment, the handshaking protocol allows the client to negotiate with the search server for determining which tasks the client will or is willing to perform. In an alternate embodiment, the client directly accesses a data source, or monitors an ongoing data stream (e.g., a music, data, information ticker, etc.), and performs the distillation process on the monitored data.

Program modules include procedures, functions, programs, components, data structures, and the like, that perform particular tasks or implement particular abstract data types. The modules may be incorporated into single and multi-processor computing systems, as well as hand-held devices and controllable consumer devices (e.g., mobile devices, set-top boxes, Internet appliances, etc.). It is understood that modules may be implemented on a single computing device, or processed over a distributed network environment, where modules can be located in both local and remote memory storage devices.

An exemplary system for implementing portions invention include a computing device **702** having system bus **704** for coupling various components within the computing device. The system **704** bus may be any of several types

of bus structures, such as PCI, AGP, VESA, Microchannel, ISA and EISA, etc. Typically, attached to the bus **704** are processors **706** such as Intel, DEC Alpha, PowerPC, programmable gate arrays, etc., a memory **708** (e.g., RAM, ROM, PROM, EEPROM, etc.), storage devices **710**, a video interface **712**, and input/output interface ports **714**. The storage systems and associated computer-readable media provide storage of data and executable instructions for the computing device **702**. Storage options include hard-drives, floppy-disks, optical storage, magnetic cassettes, tapes, flash memory cards, memory sticks, digital video disks, and the like, and may be connected to the bus **704** by way of an interface **726**.

Processors for the client **100** and search server **102** may be directed according to programming instructions encoded within nonvolatile memory (ROM, EPROM, E/EPROM, F/PGA, etc.), application specific integrated circuits (ASICs), or as part of the instructions for an operating system (e.g., the Microsoft Windows CE, Palm Computing, or other operating system may be extended to support the above-described search and distillation processes).

Computing device **702** is expected to operate in a networked environment using logical connections to one or more remote computing devices **716**, **718** through a network interface **720**, modem **722**, or other communication pathway. Computing devices may be interconnected by way of a network **724** such as a local intranet or the Internet. Thus, with respect to the illustrated embodiments, assuming computing device **702** is a client seeking to perform a

search, then remote devices **716**, **718** may be a search server **716** and another searcher **718**.

It will be appreciated that remote computing devices **716**, **718** may be configured like computing device **702**, and therefore include many or all of the elements discussed for computing device **702**. It should also be appreciated that computing devices **702**, **716**, **718** may be embodied within a single device, or separate communicatively-coupled components, and include routers, bridges, peer devices, web servers, and application programs utilizing network application protocols such as HTTP, File Transfer Protocol (FTP), Gopher, Wide Area Information Server (WAIS), and the like.

Having described and illustrated the principles of the invention with reference to illustrated embodiments, it will be recognized that the illustrated embodiments can be modified in arrangement and detail without departing from such principles.

And, even though the foregoing discussion has focused on particular embodiments, it is understood that other configurations are contemplated. In particular, even though expressions such as "in one embodiment," "in another embodiment," and the like are used herein, these phrases are meant to generally reference embodiment possibilities, and are not intended to limit the invention to particular embodiment configurations.

As used herein, these terms may reference the same or different embodiments, and unless expressly indicated otherwise, are combinable into other embodiments. Consequently, in view of the wide variety of permutations to

the above-described embodiments, the detailed description is intended to be illustrative only, and should not be taken as limiting the scope of the invention. What is claimed as the invention, therefore, is all such modifications as may come within the scope and spirit of the following claims and equivalents thereto.

5

What is claimed is:

1. A method for real-time distillation of a source document, comprising:
receiving search criteria from a client;
searching a plurality of sources based on the search criteria;
determining search results responsive to said searching;
distilling the search results in accordance with one or more data types, each data type comprising a data type constraint;
identifying one or more data type constraints for each search result;
finding the data type constraint in the context of each search result, the context having the data type constraint and text surrounding the data type constraint; and
creating a distilled result having the context.

2. A method as in claim 1, wherein the amount of text surrounding the data type constraint is defined by a user.

3. A method for real-time distillation of a source document, comprising:
receiving search criteria from a client;
searching a plurality of sources based on the search criteria;
determining search results responsive to said searching;
distilling the search results by identifying one or more key sentences for each search result;
finding the key sentence in the context of each source, the key sentence context having the key sentence and text surrounding the key sentence; and
creating a distilled result having the key sentence context.

4. A method as in claim 1, wherein the amount of text surrounding the key sentence is defined by a user.

5. A method for real-time distillation of a source document, comprising:
contacting a search server;
submitting search criteria to the search server;
receiving search results responsive to said submitting;
distilling the search results by finding one or more key sentences for each search result;
finding the key sentence in the context of each source, the key sentence context having the key sentence and text surrounding the key sentence; and
creating a distilled result having the key sentence context.

6. A method for displaying search results, comprising:
receiving search criteria from a client;
searching a plurality of sources based on the search criteria;
determining search results responsive to said searching, the search results comprising source documents;
distilling the source documents into one or more result objects, each of the result objects corresponding to one of the source documents; and
for each result object, creating an index from the result object into its corresponding source document.

7. A method as in claim 6, wherein said creating an index for a given result object comprises:
finding the portion of the corresponding source document matching a given result object; and
creating a path to the portion of the corresponding source document.

8. A method as in claim 7, wherein the portion of the corresponding source document is determined by the user.

9. A method as in claim 7, wherein the path comprises a hyperlink.

10. A method for displaying search results, comprising:
receiving search criteria from a client;
searching a plurality of sources based on the search criteria;
determining search results responsive to said searching;
distilling the search results;
creating a mid-menu by:
generating one or more result categories, each result category having a number of results; and
determining a content metric of each result category, the content metric being a measure of the value of the result category; and
displaying the mid-menu.

11. A method as in claim 10, wherein the determining of the content metric comprises determining a quantitative measure for each result type.

12. A method as in claim 11, wherein the quantitative measure comprises the number of results for each result category.

13. A method as in claim 11, wherein the quantitative measure comprises the number of occurrences of pre-specified data.

14. A method as in claim 10, wherein the determining of the content metric comprises determining a qualitative measure for each result category.

15. A method as in claim 14, wherein the qualitative measure comprises a determining the relevance of the results of the result category to the search criteria.

16. A method as in claim 10, wherein at least one of the result categories comprises a data type.

17. A method as in claim 10, wherein at least one of the result categories comprises a user-defined type.

18. A method as in claim 10, additionally comprising determining user preferences, and dynamically creating the mid-menu in accordance with the user preferences.

19. A method for displaying search results, comprising:
receiving search criteria from a client;
searching a plurality of sources based on the search criteria;
determining search results responsive to said searching;
distilling the search results;
determining user preferences;
creating a mid-menu in accordance with the user preferences by
dynamically generating one or more result categories, each result category having a number of results; and
determining a content metric associated with each result category, the content metric being a measure of the value of the result category; and
displaying the mid-menu.

20. A method as in claim 19, wherein the determining of the content metric comprises determining a quantitative measure for each result type.

21. A method as in claim 19, wherein the determining of the content metric comprises determining a qualitative measure for each result category.

Information Search, Retrieval and Distillation Into Knowledge Objects

ABSTRACT

The invention provides for various methods and apparatuses for searching bodies of knowledge, such as previously indexed source documents reachable over a network, search results from previous searches, and results from performing meta-searches. Search criteria is received from a client, and the bodies of knowledge are searched based on the search criteria, and search results provided responsive to said searching. Search results may be configured to have associated distillation triggers, where selecting a trigger causes its associated search result to be distilled in real-time. Distilled search results can be indexed into portions of the source document for focused entry, and can also be grouped and analytically presented on mid-menus to allow the user to review distilled data in summary form. Results may also have associated status symbols indicating by symbol a particular topic area to which a result is related, and by opacity or other indicator the apparent relevance of a result to the particular topic area. Search and viewing preferences may be determined according to psychometrics, user selection of a default user category, through a question/answer session, or based on monitoring user activity which incrementally defines a profile.

FIG. 1

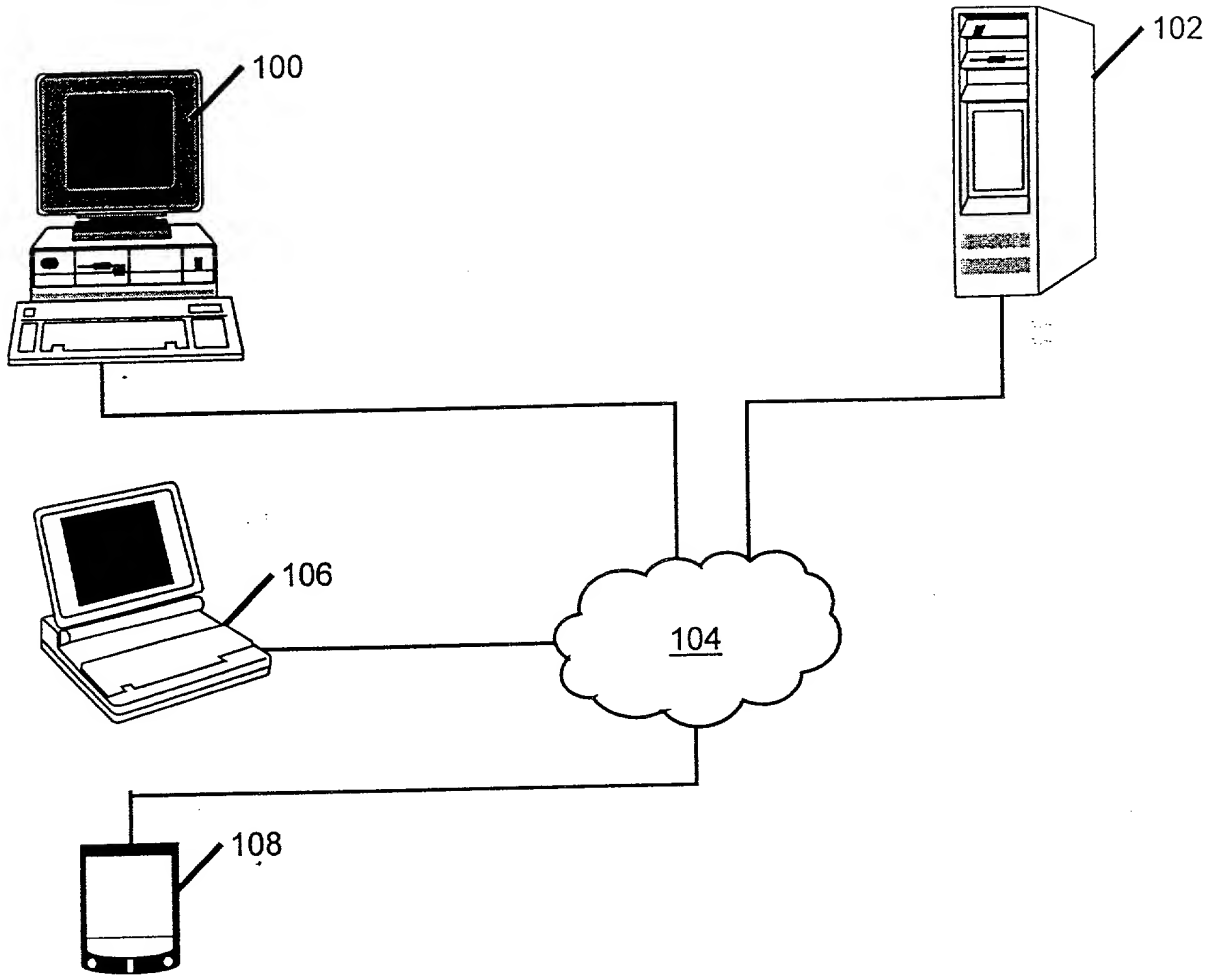


FIG. 2

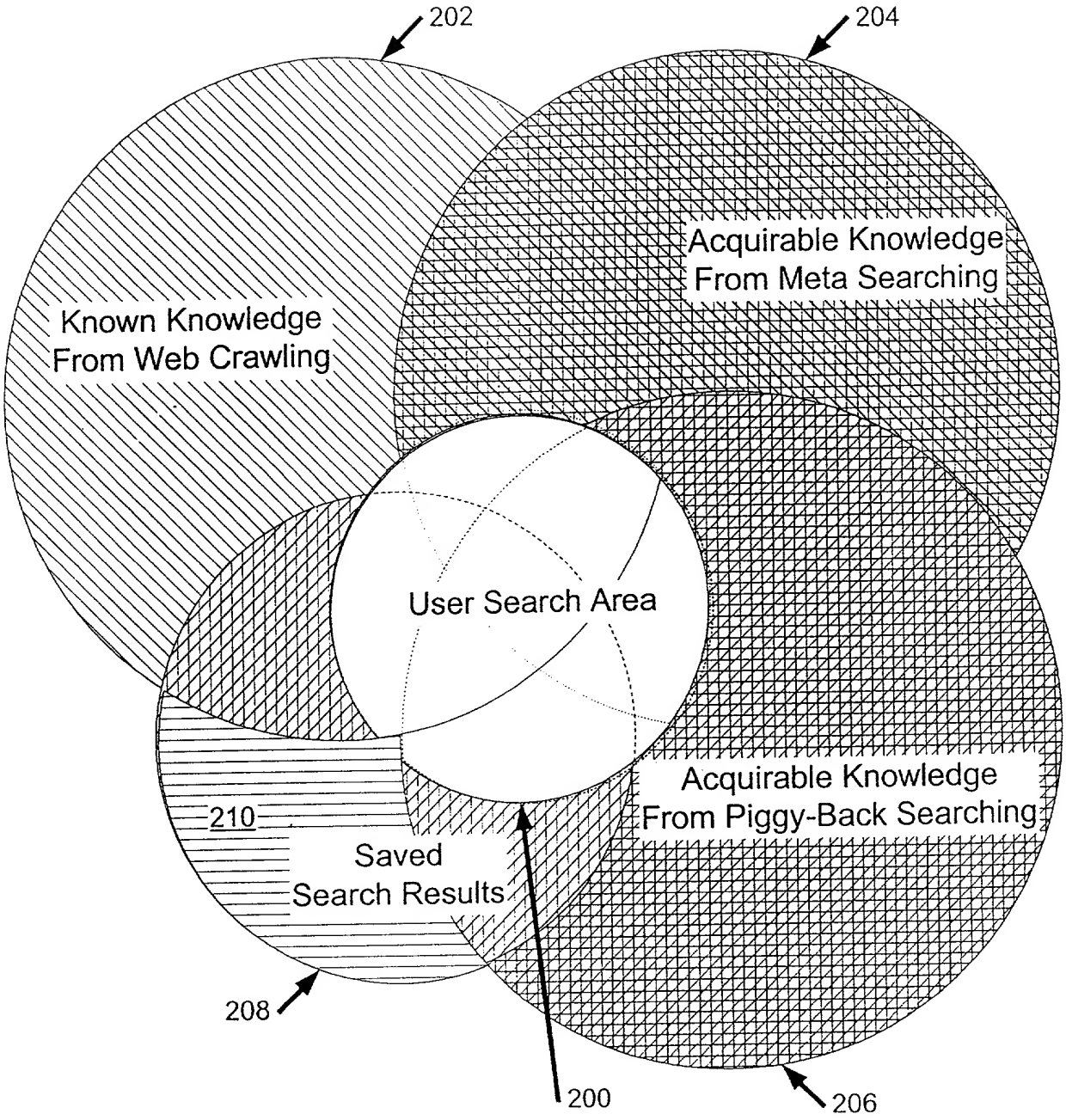
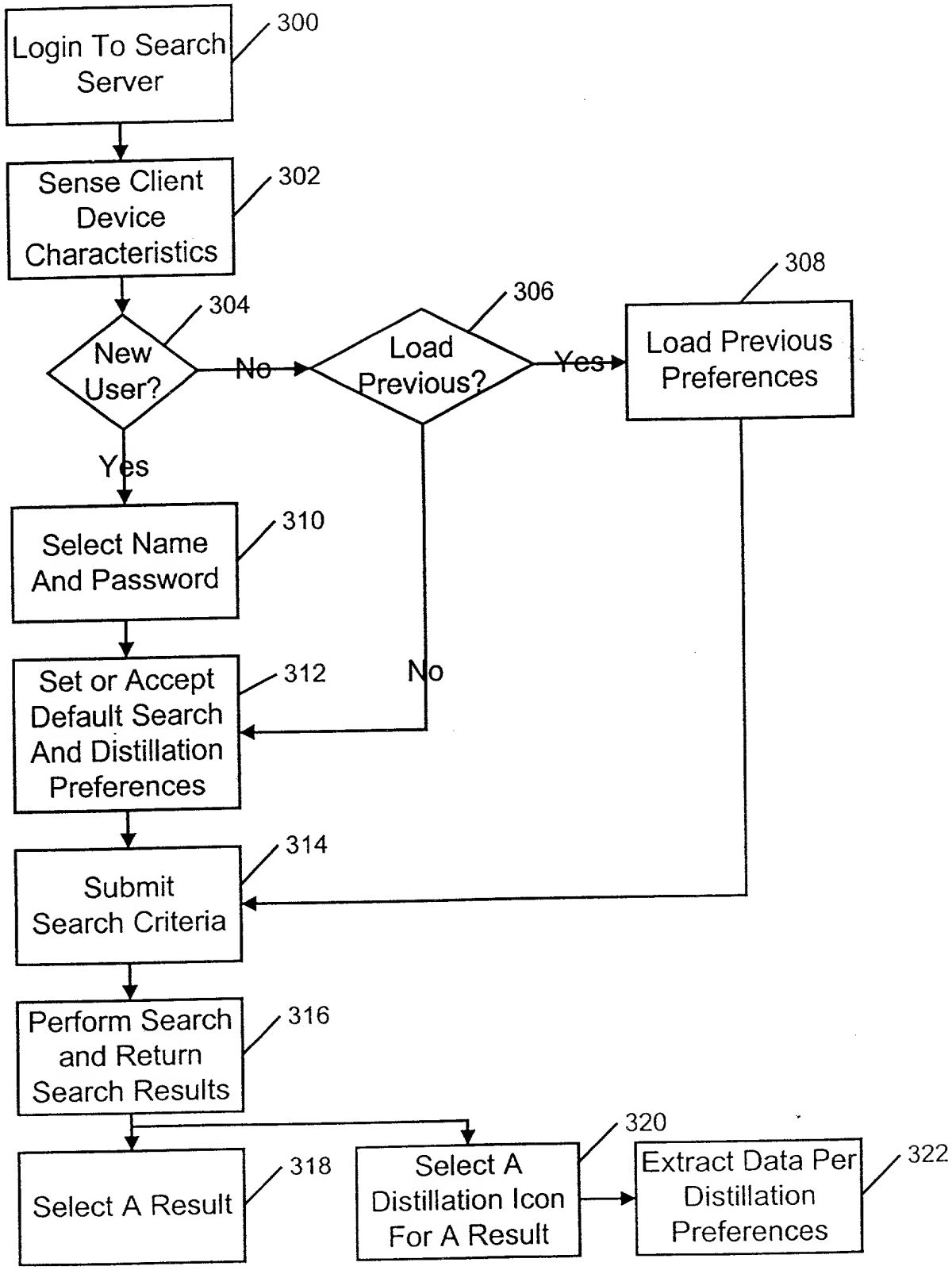

202
204
Known Knowledge
From Web Crawling
Acquirable Knowledge
From Meta Searching
User Search Area
Acquirable Knowledge
From Piggy-Back Searching
210
Saved
Search Results
208
200
206

FIG. 3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New User?
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Load Previous?
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Load Previous Preferences
308
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Select Name And Password
310
No
Set or Accept Default Search And Distillation Preferences
312
Submit Search Criteria
314
Perform Search and Return Search Results
316
Select A Result
318
Select A Distillation Icon For A Result
320
Extract Data Per Distillation Preferences
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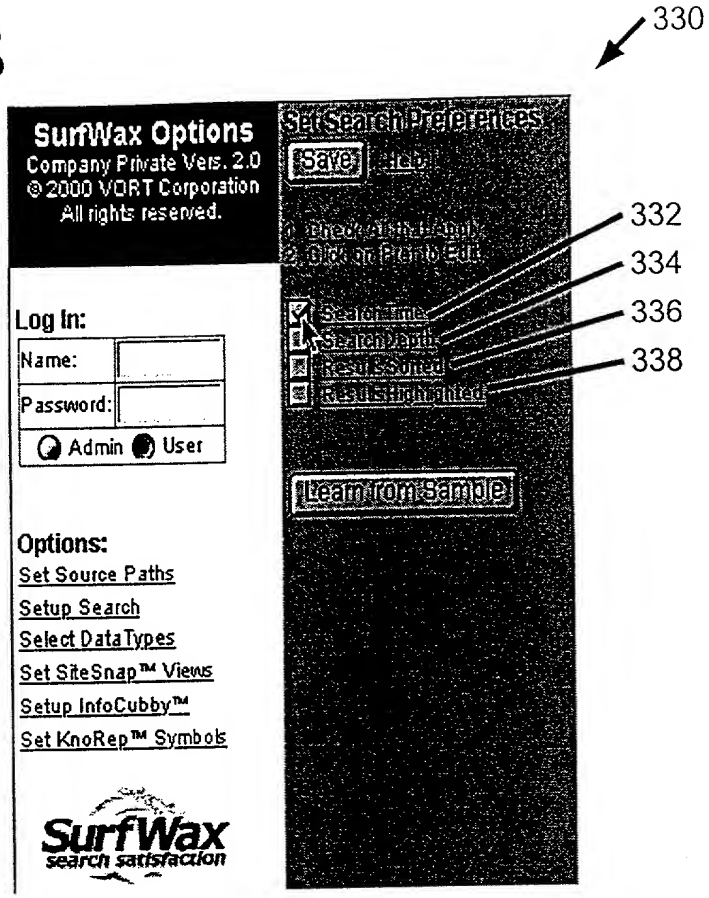
FIG. 3B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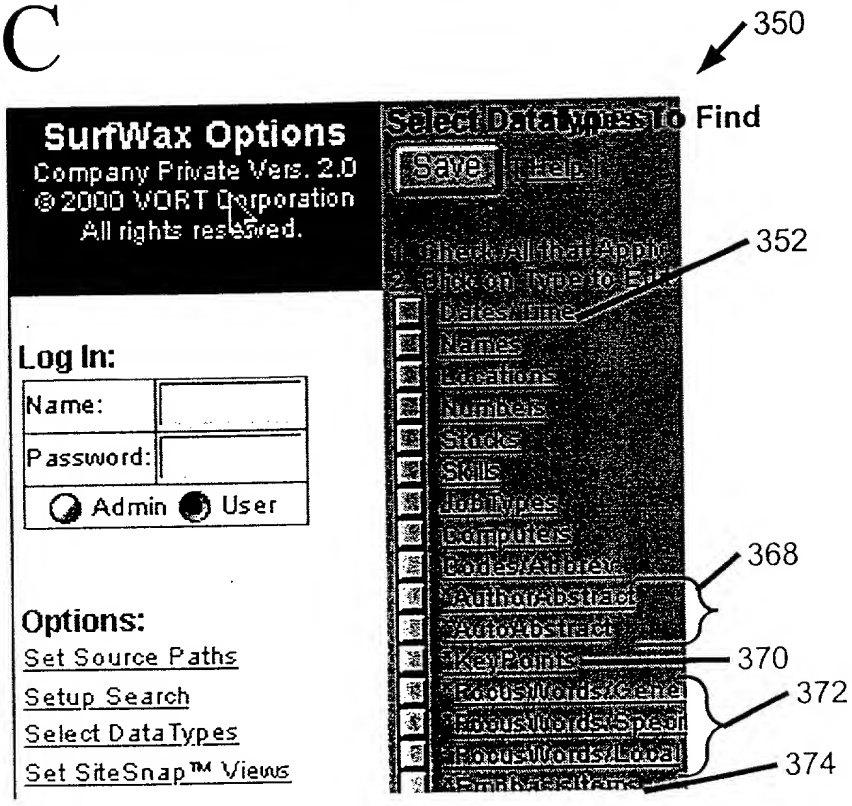
Log In:
Name:
Password:
Admin
User
Options:
Set Source Paths
Setup Search
Select DataTypes
Set SiteSnap™ Views
Setup InfoCubby™
Set KnoRep™ Symbols
SurfWax
search satisfaction
Set Search Preferences
Save
Help
332
334
336
338
Learn from Sample

FIG. 3C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Log In:
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User
Options:
Set Source Paths
Setup Search
Select DataTypes
Set SiteSnap™ Views
Select DataTypes to Find
Save
Help
352
Dates/Time
Names
Locations
Numbers
Stocks
Skills
JobTypes
Computers
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AuthorAbstract
AutoAbstract
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KeyPoints
372
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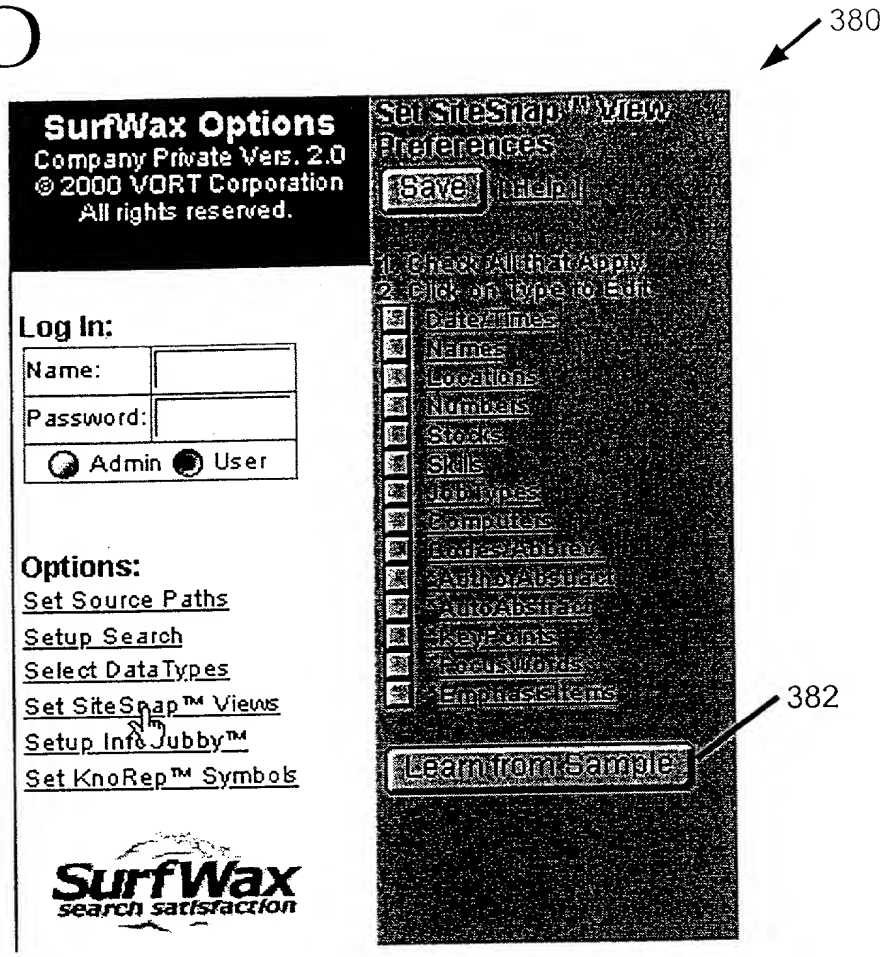
FIG. 3D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Name:
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Options:
Set Source Paths
Setup Search
Select DataTypes
Set SiteSnap™ Views
Setup InfoJubby™
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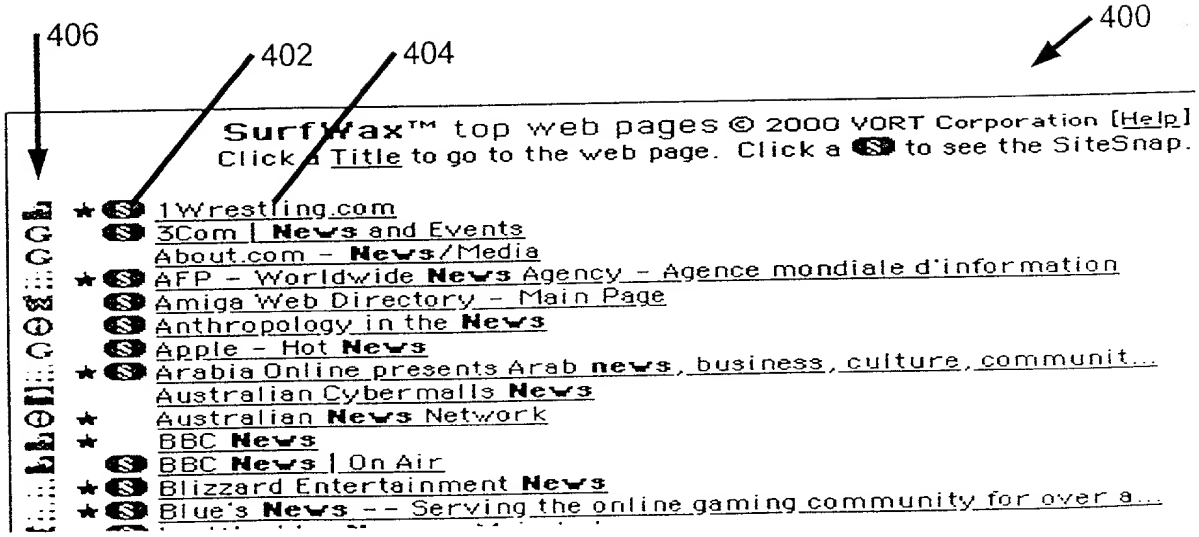
SurfWax
search satisfaction
Set SiteSnap™ View Preferences
Save
Help
1. Check All that Apply
2. Click on Type to Edit
Date/Times
Names
Locations
Numbers
Stocks
Skills
JobTypes
Computers
Codes/Abbrev
AuthorAbstract
AutoAbstract
KeyPoints
FocusWords
EmphasisItems
Learn from Sample
382

FIG. 4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402
404
400
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Arabia Online presents Arab news, business, culture, communit...
Australian Cybermalls News
Australian News Network
BBC News
BBC News | On Air
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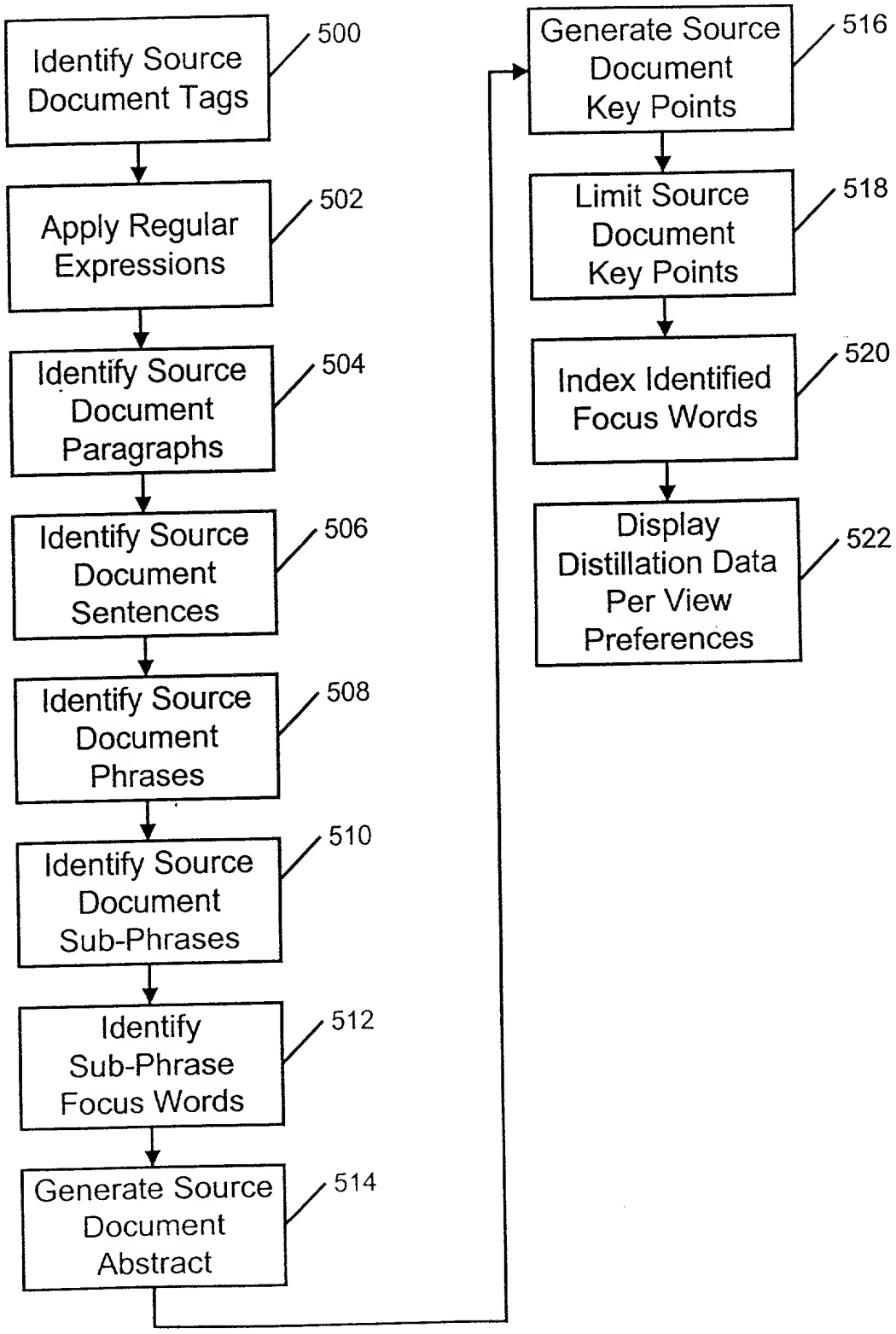
Blue's News -- Serving the online gaming community for over a...

FIG. 5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Apply Regular Expressions
502
Identify Source Document Paragraphs
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510
Identify Sub-Phrase Focus Words
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Generate Source Document Abstract
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Generate Source Document Key Points
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Limit Source Document Key Points
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Index Identified Focus Words
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Display Distillation Data Per View Preferences
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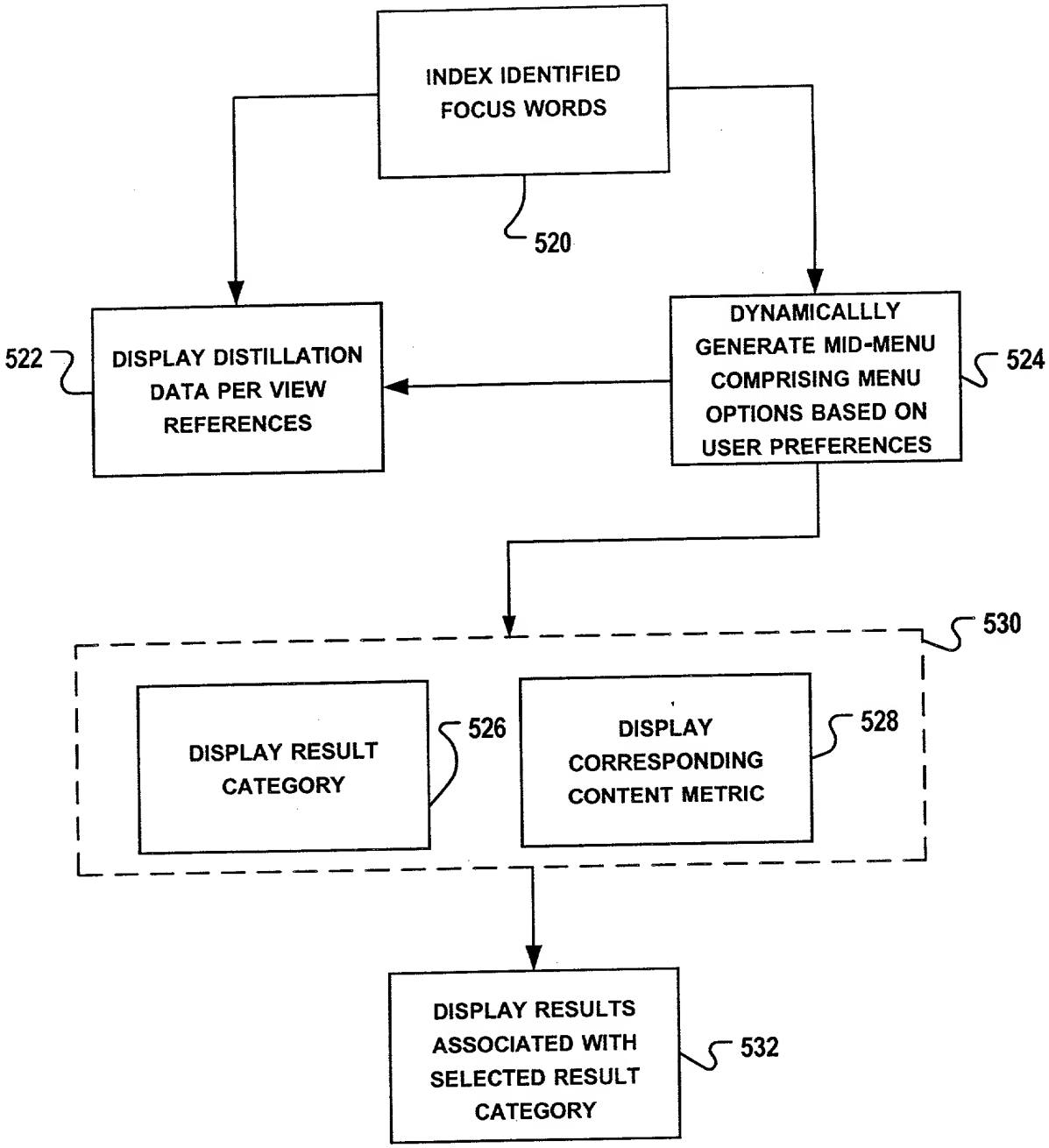
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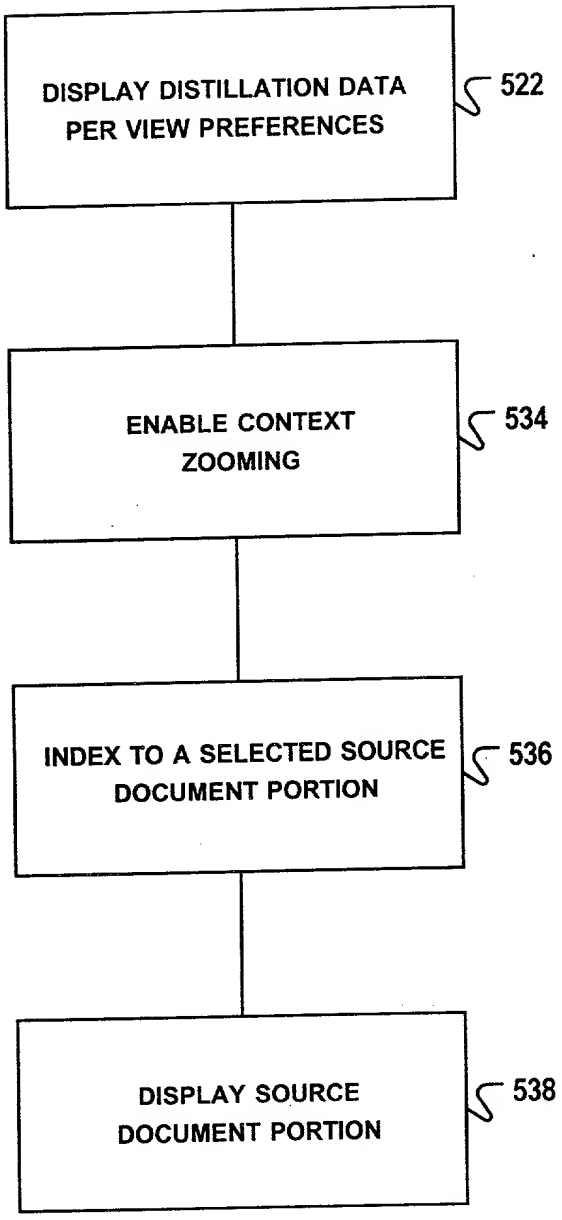
524
530
DISPLAY RESULT CATEGORY
526
DISPLAY CORRESPONDING CONTENT METRIC
528
DISPLAY RESULTS ASSOCIATED WITH SELECTED RESULT CATEGORY
532

Fig. 5b


DISPLAY DISTILLATION DATA PER VIEW PREFERENCES
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ENABLE CONTEXT ZOOMING
534
INDEX TO A SELECTED SOURCE DOCUMENT PORTION
536
DISPLAY SOURCE DOCUMENT PORTION
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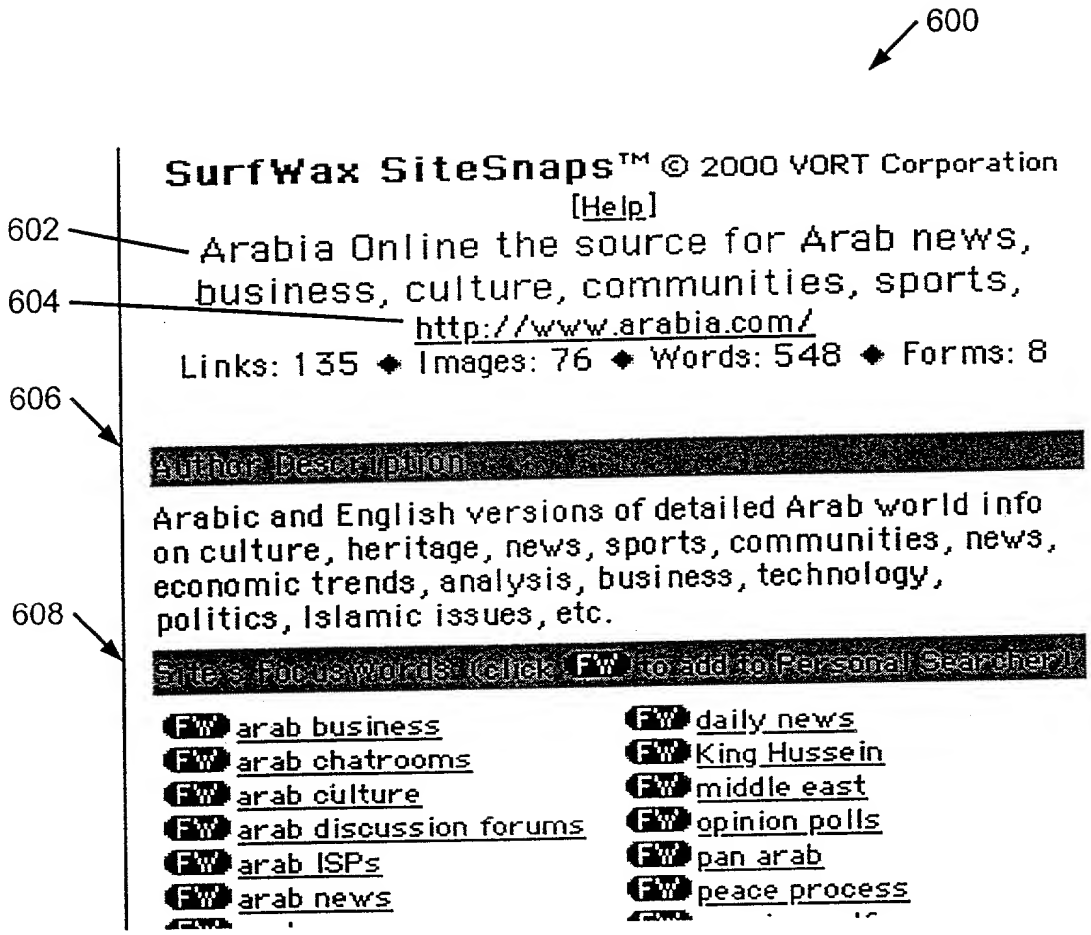
Fig 5c

FIG. 6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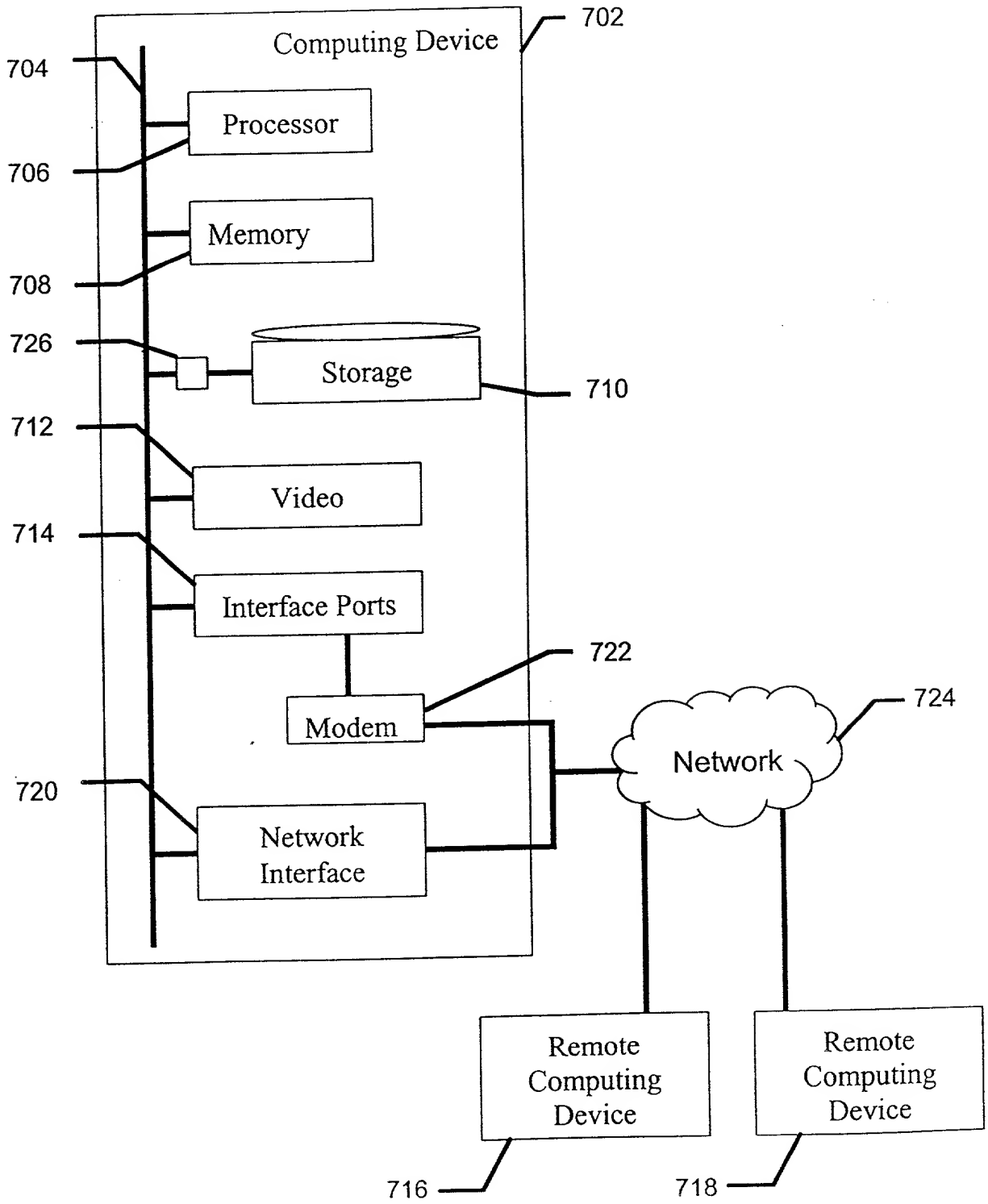
http://www.arabia.com/
Links: 135 ◆ Images: 76 ◆ Words: 548 ◆ Forms: 8
606
Author Description
Arabic and English versions of detailed Arab world info on culture, heritage, news, sports, communities, news, economic trends, analysis, business, technology, politics, Islamic issues, etc.
608
Site's Focus Words (Click FW to add to Personal Searcher)
FW arab business
FW arab chatrooms
FW arab culture
FW arab discussion forums
FW arab ISPs
FW arab news
FW daily news
FW King Hussein
FW middle east
FW opinion polls
FW pan arab
FW peace process

FIG. 7


Computing Device
702
704
Processor
706
Memory
708
726
Storage
710
712
Video
714
Interface Ports
722
Modem
724
Network
720
Network Interface
Remote Computing Device
716
Remote Computing Device
718

Attorney's Docket No.: 004117.P006X PATENT

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION
(CONTINUATION-IN-PART)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled
Information Search, Retrieval and Distillation Into Knowledge Objects

the specification of which

X is attached hereto.
___ was filed on _____ as
United States Application Number _____
or PCT International Application Number _____
and was amended on _____.
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No

I hereby claim the benefit under title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below:

Application Number _____ Filing Date _____

Application Number _____ Filing Date _____

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

09/336, 020	June 18, 1999	Pending
Application Number	**Filing Date**	**Status -- patented, pending, abandoned**

09/565,674		
Application Number	**Filing Date**	**Status -- patented, pending, abandoned**

I hereby appoint the persons listed on Appendix A hereto (which is incorporated by reference and a part of this document) as my respective patent attorneys and patent agents, with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send correspondence to Libby N. Ho, BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP, 12400 Wilshire Boulevard 7th Floor, Los Angeles, California 90025 and direct telephone calls to Libby N. Ho, (408) 720-8598.
(Name of Attorney or Agent)
(Name of Attorney or Agent)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Sole/First Inventor Thomas D. Holt

Inventor's Signature _____ Date _____

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Post Office Address 40 Moulton Drive
Atherton, CA 94027

Full Name of Third/Joint Inventor Larry Stephen Burke

Inventor's Signature _____ Date _____

Residence Victoria, Canada (City, State) Citizenship Canada (Country)

Post Office Address 303-229 Ontario Street
Victoria, Canada V8V1N1

APPENDIX A

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APPENDIX B

Title 37, Code of Federal Regulations, Section 1.56
Duty to Disclose Information Material to Patentability

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclosure information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclosure all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

(1) Prior art cited in search reports of a foreign patent office in a counterpart application, and

(2) The closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made or record in the application, and

(1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or

(2) It refutes, or is inconsistent with, a position the applicant takes in:

(i) Opposing an argument of unpatentability relied on by the Office, or

(ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

(1) Each inventor named in the application;

(2) Each attorney or agent who prepares or prosecutes the application; and

(3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.

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